IN THE CLAIMS

Please amend claims 1-37 as indicated below.

1 (Currently Amended) A method comprising:

identifying network elements at endpoints of a data connection channel;

generating a candidate path between the network elements at the endpoints;

validating the candidate path by determining whether the candidate path provides at least a service requirement ~~selected from a group consisting~~ based on a service description describing at least one of

minimum bandwidth that is to be guaranteed for each data connection,

maximum bandwidth to which each data connection is constrained,

maximum delay that packets in a data connection are allowed to tolerate,

maximum jitter that a data connection is allowed to tolerate,

minimum reliability that each data connection is to be provided,

inclusion of network elements capable of acting as security gateways that bracket untrusted sections of the candidate path,

reachability, and

data collection capability to be instantiated between network locations when the service is in use; and

configuring network elements along a validated candidate path to implement the service requirement.

2. (Currently Amended) The method of claim 1, ~~further comprising:~~ wherein the service description further describes at least one of:

subscribers who subscribe the service;

parties involved in providing or using the service;

network locations of each party;

a maximum amount of concurrent usage of the service between the network locations;

each data connection to be instantiated between the network locations when the service is in use;

whether data transfer over a data connection is one-way or two-way;

whether security is to be provided and a security profile which determines nature of the security to be provided; and

types of data to be collected regarding packets flowing through the data connection and granularity at which the data is to be collected.

~~identifying network elements at endpoints of a plurality of data connection channels;~~

~~for each data connection channel, generating at least one candidate path between the network elements at the endpoints of the data connection channel;~~

~~for each candidate path, validating the candidate path by determining whether the candidate path provides at least a service requirement selected from a group consisting of minimum bandwidth, maximum bandwidth, maximum delay, maximum jitter, reliability, inclusion of network elements capable of acting as security gateways that bracket untrusted sections of the candidate path, reachability, and data collection capability; and~~

~~configuring network elements along validated candidate paths to implement service requirements.~~

3 (Currently Amended) The method of claim 1, further comprising recording a configuration performed on the network elements in a provisioning database, wherein the provisioning database stores information selected from a group consisting of:

a service description;

a data connection description for describing one of one-way and two-way data connection channels being provisioned;

security profiles of all services previously provisioned;

a path taken through a network by each data connection channel; and

a configuration that has been performed at each router along the path taken by each data connection channel.

4. (Currently Amended) The method of claim ~~1, further comprising:~~ 3, wherein the configuration of the network elements are performed further based on network topologies of the network provided via a network topology database, wherein the network topology database stores information selected from a group consisting of:

a vendor and model of each router that determines what protocols to use to communicate with the router;

a IP subnet to which each router interface belongs;

a available bandwidth in each direction of each data link;

a status of each data link and the interfaces connected;

a type of packet forwarding mechanism used on each interface;

a copy of the routing table from each router;

a copy of any information from each router that indicates which QoS-enhanced forwarding mechanisms are directing packets;

to whom each IP subnet, and hence each router interface, is dedicated to; and

whether a router can function as a security gateway.

~~identifying data connection channels that have been provisioned to implement a service;~~

~~for each data connection channel, identifying a path followed by the data connection channel and a configuration performed to implement the service at network elements along the path;~~

~~undoing the configuration performed to implement the service at the network elements along the path; and~~

~~removing a recording of the configuration performed to implement the service on the network elements along the path.~~

5. (Currently Amended) The method of claim 1, further comprising:

identifying a change in a routing table entry;

identifying data connection channels provisioned on a data link connected to an interface referenced by the routing table entry prior to the change;

for each data connection channel provisioned on the data link, identifying whether the data connection channel is affected by the change;

for each data connection channel affected by the change, de-provisioning the data connection channel affected by the change; ~~and~~

for each data connection channel affected by the change, re-provisioning the data connection channel affected by the change;

reserving a predetermined percentage of bandwidth for each direction of a data link, wherein reserving the predetermined percentage of bandwidth is to

provide room for manually deployed services,

provide a buffer to accommodate unanticipated network traffic, and

provide a buffer to accommodate one of an imprecisely understood behaviour and an imprecise bandwidth control in a router feeding of a data link; and

determining an effective bandwidth capacity of the data link by subtracting the reserved bandwidth from an available bandwidth associated with the data link.

6. (Currently Amended) The method of claim 1, wherein generating a candidate path between the network elements at the endpoints further comprises:

assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network; and

adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link, wherein a link in the graph having heavier usage relative to other links in the graph is adjusted to a weight indicating a lesser preference, and wherein a link in the graph having lighter usage relative to other links in the graph is adjusted to a weight indicating a greater preference.

7. (Currently Amended) The method of claim 6, further comprising displaying the graph in a display, wherein vertices represent routers and links represent data links, wherein links in the graph have a directionality indicating a direction in which packets in one embodiment flow on the corresponding data link, and wherein two-way data links are represented in the graph by one of a bi-directional link and two back-to-back uni-directional links directed in opposite directions ~~wherein assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network further comprises adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link.~~

8 (Currently Amended) The method of claim 6, further comprising determining the minimum bandwidth of the candidate path that is required by the service being deployed,

wherein each data link in the candidate path includes an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel,

wherein if any data link in the candidate path does not have an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel, the corresponding available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel is removed from the graph for further consideration,

wherein the minimum bandwidth of the data connection channel is determined based on a product of the minimum bandwidth described in a corresponding data connection description and the maximum amount of concurrent service usage from the service description, and

wherein the maximum bandwidth of the data connection channel is determined based on a product of the maximum bandwidth from the corresponding data connection description and the maximum amount of concurrent service usage from the service description ~~7, wherein adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link further comprises:~~

~~adjusting a weight assigned to a link in the graph having lighter usage relative to other links in the graph to a weight indicating a greater preference; and~~

~~adjusting a weight assigned to a link in the graph having heavier usage relative to other links in the graph to a weight indicating a lesser preference~~.

9 (Currently Amended) The method of claim [[7]] 8, wherein if a router is not capable of managing cross-router queuing delay, the minimum bandwidth is determined based on the following:

$BW_{min}=\max(BW_{max}, (S_{max} / D_{max}))$,

wherein BW_{min} represents a minimum bandwith in bits per second, wherein BW_{max} represents a required maximum bandwidth from the data connection description in bits per second, wherein S_{max} represents a maximum size of a packet in bits, and wherein D_{max} represents a maximum cross router queuing delay in seconds

~~adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link further comprises:~~

~~adjusting a weight assigned to a link in the graph having heavier usage relative to other links in the graph to a weight indicating a greater preference; and~~

~~adjusting a weight assigned to a link in the graph having lighter usage relative to other links in the graph to a weight indicating a lesser preference~~.

10). (Currently Amended) A method for a provisioning system comprising:

[[a)]] identifying a candidate path for a newly requested service, the newly requested service having a service description, wherein the newly requested service is in an Internet Protocol (IP) network, the IP network having a plurality of routers, wherein the identified candidate path travels through a set of the plurality of routers;

[[b)]] determining whether the set of the plurality of routers can be configured to meet a set of requirements specified by the service description,

wherein each data link in the candidate path includes an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel,

wherein if any data link in the candidate path does not have an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel, the corresponding available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel is removed from the graph for further consideration,

wherein the minimum bandwidth of the data connection channel is determined based on a product of the minimum bandwidth described in a corresponding data connection description and the maximum amount of concurrent service usage from the service description, and

wherein the maximum bandwidth of the data connection channel is determined based on a product of the maximum bandwidth from the corresponding data connection description and the maximum amount of concurrent service usage from the service description; and

[[c)]] if the set of the plurality of routers are determined to meet the set of requirements, then translating the set of requirements into a corresponding set of router management commands to configure each router in the set of the plurality of routers.

11. (Currently Amdned) The method of claim 10, wherein the service description comprises ~~further comprising~~:

a minimum bandwidth that is to be guaranteed for each data connection,

a maximum bandwidth to which each data connection is constrained,

a maximum delay that packets in a data connection are allowed to tolerate,

a maximum jitter that a data connection is allowed to tolerate,

minimum reliability that each data connection is to be provided,

an inclusion of network elements capable of acting as security gateways that bracket untrusted sections of the candidate path,

reachability,

a data collection capability to be instantiated between network locations when the service is in use,

subscribers who subscribe the service,

parties involved in providing or using the service,

network locations of each party,

a maximum amount of concurrent usage of the service between the network locations,

each data connection to be instantiated between the network locations when the service is in use,

whether data transfer over a data connection is one-way or two-way,

whether security is to be provided and a security profile which determines nature of the security to be provided, and

types of data to be collected regarding packets flowing through the data connection and granularity at which the data is to be collected.

~~d) identifying a plurality of candidate paths for a newly requested service, the newly requested service having a service description, wherein the newly requested service is in an Internet Protocol (IP) network, the IP network having a plurality of routers, wherein each candidate path of the plurality of candidate paths travels through a subset of the plurality of routers;~~

~~e) for each candidate path, determining whether a subset of the plurality of routers can be configured to meet a set of requirements specified by the service description; and~~

~~f) for each set of requirements, if a subset of the plurality of routers are determined to meet the set of requirements, then translating the set of requirements into a corresponding set of router management commands to configure each router in the subset of the plurality of routers.~~

12. (Currently Amended) The method of claim 10, further comprising:

reserving a predetermined percentage of bandwidth for each direction of a data link,

wherein reserving the predetermined percentage of bandwidth is to

provide room for manually deployed services,

provide a buffer to accommodate unanticipated network traffic, and

provide a buffer to accommodate one of an imprecisely understood behaviour and an imprecise bandwidth control in a router feeding of a data link; and

determining an effective bandwidth capacity of the data link by subtracting the reserved bandwidth from an available bandwidth associated with the data link.

~~wherein the set of requirements includes one or more of quality of service, security, reachability, and data collection specifications.~~

13. (Currently Amended) The method of claim 10, further comprising:

assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network;

adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link, wherein a link in the graph having heavier usage relative to other links in the graph is adjusted to a weight indicating a lesser preference, and wherein a link in the graph having lighter usage relative to other links in the graph is adjusted to a weight indicating a greater preference; and

displaying the graph in a display, wherein vertices represent routers and links represent data links, wherein links in the graph have a directionality indicating a

direction in which packets in one embodiment flow on the corresponding data link, and wherein two-way data links are represented in the graph by one of a bi-directional link and two back-to-back uni-directional links directed in opposite directions.

~~if the identified candidate path cannot fulfill the set of requirements and there are other untried candidate paths, then identifying a different candidate path and repeating steps b) and c).~~

14. (Currently Amended) The method of claim 10, wherein if a router is not capable of managing cross-router queuing delay, the minimum bandwidth is determined based on the following:

$BW_{min}=\max(BW_{max}, (S_{max} / D_{max}))$,

wherein BW_{min} represents a minimum bandwith in bits per second, wherein BW_{max} represents a required maximum bandwidth from the data connection description in bits per second, wherein S_{max} represents a maximum size of a packet in bits, and wherein D_{max} represents a maximum cross router queuing delay in seconds ~~the translating includes querying a network topology database to determine the capabilities of each router of the plurality of routers~~.

15. (Currently Amended) A method for a provisioning system comprising:

identifying a set of one or more candidate paths for a newly requested service in an Internet Protocol (IP) network having a plurality of routers, wherein each of the candidate paths travels through a different subset of the plurality of routers, the newly requested service having a service description;

eliminating a candidate path from the set of candidate paths whose corresponding

subset of the plurality of routers cannot be configured to meet the set of requirements specified by the service description including a minimum bandwidth required by the service being deployed, wherein the minimum bandwidth is determined based on $BW_{min}=max(BW_{max}, (S_{max} / D_{max}))$, wherein BW_{min} represents a minimum bandwith in bits per second, wherein BW_{max} represents a required maximum bandwidth from the data connection description in bits per second, wherein S_{max} represents a maximum size of a packet in bits, and wherein D_{max} represents a maximum cross router queuing delay in seconds; and

translating a remaining candidate path into a set of router management commands to configure the subset of the plurality of routers.

16. (Currently Amended) The method of claim 15, further comprising:

reserving a predetermined percentage of bandwidth for each direction of a data link, wherein reserving the predetermined percentage of bandwidth is to

provide room for manually deployed services,

provide a buffer to accommodate unanticipated network traffic, and

provide a buffer to accommodate one of an imprecisely understood behaviour and an imprecise bandwidth control in a router feeding of a data link; and

determining an effective bandwidth capacity of the data link by subtracting the reserved bandwidth from an available bandwidth associated with the data link.

~~wherein the set of requirements includes one or more of quality of service, security, and data collection specifications.~~

17. (Currently Amended) The method of claim 15, further comprising:

assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network;

adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link, wherein a link in the graph having heavier usage relative to other links in the graph is adjusted to a weight indicating a lesser preference, and wherein a link in the graph having lighter usage relative to other links in the graph is adjusted to a weight indicating a greater preference; and

displaying the graph in a display, wherein vertices represent routers and links represent data links, wherein links in the graph have a directionality indicating a direction in which packets in one embodiment flow on the corresponding data link, and wherein two-way data links are represented in the graph by one of a bi-directional link and two back-to-back uni-directional links directed in opposite directions.

~~wherein the identifying includes querying a provisioned services database to add together the bandwidth commitments of previously deployed services to determine if each of the candidate paths has sufficient uncommitted bandwidth for the newly requested service.~~

18. (Currently Amended) A provisioning system comprising:

a provisioning engine coupled to a network topology database and a provisioned services database, the provisioning engine to identify candidate paths for newly

requested services in a network, each of the newly requested services having a corresponding service description that specifies a corresponding set of requirements, wherein each of the candidate paths are to include a subset of routers of a plurality of routers in the network, wherein the provisioning engine is to determine whether a set of the candidate paths meet the corresponding set of requirements including a minimum bandwidth required by the service being deployed, wherein the minimum bandwidth is determined based on $BW_{min}=\max(BW_{max}, (S_{max} / D_{max}))$,

wherein BW_{min} represents a minimum bandwith in bits per second, wherein BW_{max} represents a required maximum bandwidth from the data connection description in bits per second, wherein S_{max} represents a maximum size of a packet in bits, and wherein D_{max} represents a maximum cross router queuing delay in seconds; and

a translation module coupled to the provisioning engine, the translation module to translate the set of requirements for a set of candidate paths that meet the corresponding set of requirements, the translation to generate corresponding router management commands to configure routers in the plurality of routers.

19. (Currently Amended) The provisioning system of claim 18, wherein the provisioning engine is further to:

reserve a predetermined percentage of bandwidth for each direction of a data link to provide room for manually deployed services,

provide a buffer to accommodate unanticipated network traffic, and

provide a buffer to accommodate one of an imprecisely understood behaviour and an imprecise bandwidth control in a router feeding of a data link; and

determine an effective bandwidth capacity of the data link by subtracting the reserved bandwidth from an available bandwidth associated with the data link.

~~wherein the set of requirements includes one or more of quality of service, security, and data collection specifications.~~

20. (Currently Amended) The provisioning system of claim 18, wherein the provisioning engine is further to

assign to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network;

adjust a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link, wherein a link in the graph having heavier usage relative to other links in the graph is adjusted to a weight indicating a lesser preference, and wherein a link in the graph having lighter usage relative to other links in the graph is adjusted to a weight indicating a greater preference; and

display the graph in a display, wherein vertices represent routers and links represent data links, wherein links in the graph have a directionality indicating a direction in which packets in one embodiment flow on the corresponding data link, and wherein two-way data links are represented in the graph by one of a bi-directional link and two back-to-back uni-directional links directed in

opposite directions.

~~wherein the translation module is to store the configuration of the routers in the provisioned services database.~~

2. (Currently Amended) A machine-readable medium that provides instructions that, when executed by a machine, cause the machine to perform operations comprising:

identifying network elements at endpoints of a data connection channel;

generating a candidate path between the network elements at the endpoints;

validating the candidate path by determining whether the candidate path provides at least a service requirement ~~selected from a group consisting~~ based on a service description describing at least one of

minimum bandwidth that is to be guaranteed for each data connection,

maximum bandwidth to which each data connection is constrained,

maximum delay that packets in a data connection are allowed to tolerate,

maximum jitter that a data connection is allowed to tolerate,

minimum reliability that each data connection is to be provided,

inclusion of network elements capable of acting as security gateways that bracket untrusted sections of the candidate path,

reachability, and

data collection capability to be instantiated between network locations when the service is in use; and

configuring network elements along a validated candidate path to implement the service requirement.

22. (Currently Amended) The machine-readable medium of claim 21, wherein the service description further describes at least one of ~~wherein operations further comprise~~:

subscribers who subscribe the service;

parties involved in providing or using the service;

network locations of each party;

a maximum amount of concurrent usage of the service between the network locations;

each data connection to be instantiated between the network locations when the service is in use;

whether data transfer over a data connection is one-way or two-way;

whether security is to be provided and a security profile which determines nature of the security to be provided; and

types of data to be collected regarding packets flowing through the data connection and granularity at which the data is to be collected.

~~identifying network elements at endpoints of a plurality of data connection channels;~~

~~for each data connection channel, generating at least one candidate path between the network elements at the endpoints of the data connection channel;~~

~~for each candidate path, validating the candidate path by determining whether the candidate path provides at least a service requirement selected from a group consisting of minimum bandwidth, maximum bandwidth, maximum delay, maximum jitter, reliability, inclusion of network elements capable of acting as security gateways that bracket untrusted sections of the candidate path, reachability, and data collection capability; and~~

~~configuring network elements along validated candidate paths to implement service requirements.~~

23. (Currently Amended) The machine-readable medium of claim 21, wherein operations further comprise recording a configuration performed on the network elements in a provisioning database, wherein the provisioning database stores information selected from a group consisting of:

a service description;

a data connection description for describing one of one-way and two-way data connection channels being provisioned;

security profiles of all services previously provisioned;

a path taken through a network by each data connection channel; and

a configuration that has been performed at each router along the path taken by each data connection channel.

24. (Currently Amended) The machine-readable medium of claim ~~21, wherein operations further comprise:~~ 23, wherein the configuration of the network elements are performed further based on network topologies of the network provided via a network topology database, wherein the network topology database stores information selected from a group consisting of:

a vendor and model of each router that determines what protocols to use to communicate with the router;

a IP subnet to which each router interface belongs;

a available bandwidth in each direction of each data link;

a status of each data link and the interfaces connected;

a type of packet forwarding mechanism used on each interface;

a copy of the routing table from each router;

a copy of any information from each router that indicates which QoS-enhanced forwarding mechanisms are directing packets;

to whom each IP subnet, and hence each router interface, is dedicated to; and

whether a router can function as a security gateway.

~~identifying data connection channels that have been provisioned to implement a service;~~

~~for each data connection channel, identifying a path followed by the data connection channel and a configuration performed to implement the service at network elements along the path;~~

~~undoing the configuration performed to implement the service at the network elements along the path; and~~

~~removing a recording of the configuration performed to implement the service on the network elements along the path.~~

25. (Currently Amended) The machine-readable medium of claim 21, wherein operations further comprise:

identifying a change in a routing table entry;

identifying data connection channels provisioned on a data link connected to an interface referenced by the routing table entry prior to the change;

for each data connection channel provisioned on the data link, identifying whether the data connection channel is affected by the change;

for each data connection channel affected by the change, de-provisioning the data connection channel affected by the change; ~~and~~

for each data connection channel affected by the change, re-provisioning the data connection channel affected by the change;

reserving a predetermined percentage of bandwidth for each direction of a data link, wherein reserving the predetermined percentage of bandwidth is to

provide room for manually deployed services,

provide a buffer to accommodate unanticipated network traffic, and

provide a buffer to accommodate one of an imprecisely understood behaviour and an imprecise bandwidth control in a router feeding of a data link; and

determining an effective bandwidth capacity of the data link by subtracting the reserved bandwidth from an available bandwidth associated with the data link.

26. (Currently Amended) The machine-readable medium of claim 21, wherein operations further comprise;

assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network; and

adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link, wherein a link in the graph having heavier usage relative to other links in the graph is adjusted to a weight indicating a lesser preference, and wherein a link in the graph having lighter usage relative to other links in the graph is adjusted to a weight indicating a greater preference.

27. (Currently Amended) The machine-readable medium of claim 26, wherein the operations further comprise displaying the graph in a display, wherein vertices represent routers and links represent data links, wherein links in the graph have a directionality indicating a direction in which packets in one embodiment flow on the corresponding data link, and wherein two-way data links are represented in the graph by one of a bi-directional link and two back-to-back uni-directional links directed in opposite directions ~~wherein assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network further comprises adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link~~.

28. (Currently Amended) The machine-readable medium of claim 27, further comprising determining the minimum bandwidth of the candidate path that is required by the service being deployed,

wherein each data link in the candidate path includes an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel,

wherein if any data link in the candidate path does not have an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel, the corresponding available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel is removed from the graph for further consideration,

wherein the minimum bandwidth of the data connection channel is determined based on a product of the minimum bandwidth described in a corresponding data

connection description and the maximum amount of concurrent service usage from the service description, and

wherein the maximum bandwidth of the data connection channel is determined based on a product of the maximum bandwidth from the corresponding data connection description and the maximum amount of concurrent service usage from the service description ~~wherein adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link further comprises:~~

~~adjusting a weight assigned to a link in the graph having lighter usage relative to other links in the graph to a weight indicating a greater preference; and~~

~~adjusting a weight assigned to a link in the graph having heavier usage relative to other links in the graph to a weight indicating a lesser preference.~~

29 (Currently Amended) The machine-readable medium of claim 28, wherein if a router is not capable of managing cross-router queuing delay, the minimum bandwidth is determined based on the following:

$BW_{min}=\max(BW_{max}, (S_{max} / D_{max}))$,

wherein BW_{min} represents a minimum bandwith in bits per second, wherein BW_{max} represents a required maximum bandwidth from the data connection description in bits per second, wherein S_{max} represents a maximum size of a packet in bits, and wherein D_{max} represents a maximum cross router queuing delay in seconds ~~27, wherein adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link further comprises:~~

~~adjusting a weight assigned to a link in the graph having heavier usage relative to other links in the graph to a weight indicating a greater preference; and~~

~~adjusting a weight assigned to a link in the graph having lighter usage relative to other links in the graph to a weight indicating a lesser preference.~~

30. (Currently Amended) A machine-readable medium that provides instructions that, when executed by a machine, cause the machine to perform operations comprising:

[[a)]] identifying a candidate path for a newly requested service, the newly requested service having a service description, wherein the newly requested service is in an Internet Protocol (IP) network, the IP network having a plurality of routers, wherein the identified candidate path travels through a set of the plurality of routers;

[[b)]] determining whether the set of the plurality of routers can be configured to meet a set of requirements specified by the service description,

wherein each data link in the candidate path includes an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel,

wherein if any data link in the candidate path does not have an available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel, the corresponding available bandwidth equal or greater than the minimum bandwidth of the corresponding data connection channel is removed from the graph for further consideration,

wherein the minimum bandwidth of the data connection channel is determined

based on a product of the minimum bandwidth described in a corresponding data connection description and the maximum amount of concurrent service usage from the service description, and

wherein the maximum bandwidth of the data connection channel is determined based on a product of the maximum bandwidth from the corresponding data connection description and the maximum amount of concurrent service usage from the service description; and

[[c)]] if the set of the plurality of routers are determined to meet the set of requirements, then translating the set of requirements into a corresponding set of router management commands to configure each router in the set of the plurality of routers.

31 (Currently Amended) The machine-readable medium of claim 30, wherein the service description comprises ~~operations further comprise~~:

a minimum bandwidth that is to be guaranteed for each data connection,

a maximum bandwidth to which each data connection is constrained,

a maximum delay that packets in a data connection are allowed to tolerate,

a maximum jitter that a data connection is allowed to tolerate,

minimum reliability that each data connection is to be provided,

an inclusion of network elements capable of acting as security gateways that bracket untrusted sections of the candidate path,

reachability,

a data collection capability to be instantiated between network locations when the service is in use,

subscribers who subscribe the service,

parties involved in providing or using the service,

network locations of each party,

a maximum amount of concurrent usage of the service between the network locations,

each data connection to be instantiated between the network locations when the service is in use,

whether data transfer over a data connection is one-way or two-way,

whether security is to be provided and a security profile which determines nature of the security to be provided, and

types of data to be collected regarding packets flowing through the data connection and granularity at which the data is to be collected.

~~d) identifying a plurality of candidate paths for a newly requested service, the newly requested service having a service description, wherein the newly requested service is in an Internet Protocol (IP) network, the IP network having a plurality of routers, wherein each candidate path of the plurality of candidate paths travels through a subset of the plurality of routers;~~

~~e) for each candidate path, determining whether a subset of the plurality of routers can be configured to meet a set of requirements specified by the service description; and~~

~~f) for each set of requirements, if a subset of the plurality of routers are determined to meet the set of requirements, then translating the set of requirements into a~~

~~corresponding set of router management commands to configure each router in the subset of the plurality of routers.~~

32. (Currently Amended) The machine-readable medium of claim 30, further comprising:

reserving a predetermined percentage of bandwidth for each direction of a data link, wherein reserving the predetermined percentage of bandwidth is to

provide room for manually deployed services,

provide a buffer to accommodate unanticipated network traffic, and

provide a buffer to accommodate one of an imprecisely understood behaviour and an imprecise bandwidth control in a router feeding of a data link; and

determining an effective bandwidth capacity of the data link by subtracting the reserved bandwidth from an available bandwidth associated with the data link.

~~wherein the set of requirements includes one or more of quality of service, security, reachability, and data collection specifications.~~

33 (Currently Amended) The machine-readable medium of claim 30, wherein operations further comprise:

assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network;

adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link, wherein a link in the graph having heavier usage relative to other links in the graph is adjusted to a weight indicating a

lesser preference, and wherein a link in the graph having lighter usage relative to other links in the graph is adjusted to a weight indicating a greater preference; and

displaying the graph in a display, wherein vertices represent routers and links represent data links, wherein links in the graph have a directionality indicating a direction in which packets in one embodiment flow on the corresponding data link, and wherein two-way data links are represented in the graph by one of a bi-directional link and two back-to-back uni-directional links directed in opposite directions.

~~if the identified candidate path cannot fulfill the set of requirements and there are other untried candidate paths, then identifying a different candidate path and repeating steps b) and c).~~

34. (Currently Amended) The machine-readable medium of claim 30, wherein if a router is not capable of managing cross-router queuing delay, the minimum bandwidth is determined based on the following:

$$BW_{min}=\max(BW_{max}, (S_{max} / D_{max})),$$

wherein BW_{min} represents a minimum bandwith in bits per second, wherein BW_{max} represents a required maximum bandwidth from the data connection description in bits per second, wherein S_{max} represents a maximum size of a packet in bits, and wherein D_{max} represents a maximum cross router queuing delay in seconds ~~the translating includes querying a network topology database to determine the capabilities of each router of the plurality of routers~~.

35. (Currently Amended) A machine-readable medium that provides instructions that,

when executed by a machine, cause the machine to perform operations comprising:

identifying a set of one or more candidate paths for a newly requested service in an Internet Protocol (IP) network having a plurality of routers, wherein each of the candidate paths travels through a different subset of the plurality of routers, the newly requested service having a service description;

eliminating a candidate path from the set of candidate paths whose corresponding subset of the plurality of routers cannot be configured to meet the set of requirements specified by the service descriptionincluding a minimum bandwidth required by the service being deployed, wherein the minimum bandwidth is determined based on $BW_{min}=max(BW_{max}, (S_{max} / D_{max}))$, wherein BW_{min} represents a minimum bandwith in bits per second, wherein BW_{max} represents a required maximum bandwidth from the data connection description in bits per second, wherein S_{max} represents a maximum size of a packet in bits, and wherein D_{max} represents a maximum cross router queuing delay in seconds; and

translating a remaining candidate path into a set of router management commands to configure the subset of the plurality of routers.

36. (Currently Amended) The machine-readable medium of claim 35, wherein the operations further comprise:

reserving a predetermined percentage of bandwidth for each direction of a data link, wherein reserving the predetermined percentage of bandwidth is to provide room for manually deployed services,

provide a buffer to accommodate unanticipated network traffic, and

provide a buffer to accommodate one of an imprecisely understood behaviour and an imprecise bandwidth control in a router feeding of a data link; and

determining an effective bandwidth capacity of the data link by subtracting the reserved bandwidth from an available bandwidth associated with the data link.

~~wherein the set of requirements includes one or more of quality of service, security, and data collection specifications.~~

37. (Currently Amended) The machine-readable medium of claim 35, wherein the operations further comprise:

assigning to a link in a graph that is not in a preferred area of a network a weight that is different than a weight assigned to a link in the graph that is in a preferred area of the network;

adjusting a weight assigned to a link in the graph depending on a proportion of usage of available bandwidth of the link, wherein a link in the graph having heavier usage relative to other links in the graph is adjusted to a weight indicating a lesser preference, and wherein a link in the graph having lighter usage relative to other links in the graph is adjusted to a weight indicating a greater preference; and

displaying the graph in a display, wherein vertices represent routers and links represent data links, wherein links in the graph have a directionality indicating a direction in which packets in one embodiment flow on the corresponding data link, and wherein two-way data links are represented in the graph by one of a bi-directional link and two back-to-back uni-directional links directed in

opposite directions.

~~wherein the identifying includes querying a provisioned services database to add together the bandwidth commitments of previously deployed services to determine if each of the candidate paths has sufficient uncommitted bandwidth for the newly requested service.~~